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Title: Prosocial skills in young children with autism, and their mothers' psychological well-being: longitudinal relationships.

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Abstract

The study aimed to explore the longitudinal association between prosocial skills in young children with an ASD and maternal psychological well-being. Participants were 132 children with autism drawn from the British Millennium Cohort Study (aged 9 months, 3 and 5 years). Three-wave cross-lagged structural equation models tested whether children's prosocial skills were reciprocally related to maternal psychological distress and life satisfaction. Findings indicated that relationships were not bidirectional, as both maternal outcomes were not associated with children's prosocial skills two years later. However, prosocial skills at 3 years were associated with improved maternal well-being (less distress and more life satisfaction) when children were 5-years-old. The study adds to the limited evidence base on bidirectional relationships between prosocial skills in ASD and proximal environmental variables. Findings highlight the importance of testing for reciprocal relationships rather than assuming unidirectional effects. In addition, they indicate that other-directed behaviors in children with autism have the potential to boost maternal well-being.

Keywords: autism, prosocial skills, distress, life satisfaction, bidirectional

1 . Introduction

Prosocial skills refer to intentional behaviors directed toward other people, such as helping, sharing, taking turns, and showing empathy. Prosocial skills are part of the multidimensional construct of social skills that also encompasses social competence and social relationships. Prosocial skills are instrumental in mastering these other types of social skills as children who display higher levels of prosocial behaviors are more likely to display social competence, engage in peer-relationships, and have successful social interactions (Stump, Ratliff, Wu, & Hawley, 2009).

Deficits in social behavior, especially social communication and social interactions, are a core diagnostic feature for autism (DSM-V and ICD-10), and the severity of autism is largely described by the severity of limitations in social behaviors. Low prosocial skill levels are highly predictive of a diagnosis of an autism spectrum disorder (ASD) (Goodman, Lamping, & Ploubidis, 2010), suggesting that prosocial skills are a significant part of the social skill deficit that contributes to the autism phenotype and that is associated with an autism diagnosis. Prosocial skills in children with autism are present at significantly lower levels than in typically developing peers, and their trajectory throughout childhood and adolescence remains at lower levels compared to children without disabilities (Iizuka et al., 2010; Russell et al., 2012).

Eisenberg, Fabes and Spinrad (2006) define prosocial skills as voluntary behaviors intended to benefit others and suggest that these skills start developing in infancy under the influence of biological and, mostly, environmental factors. Researchers who have examined the development of social and prosocial skills in typically developing infants and young children identify two important environmental factors: sensitive and responsive communication, and maternal psychological well-being (Choi, 2013; Feldman, Bamberger, & Kanat-Maymon, 2013; Eisenberg et al., 2006). Depression, the most frequently studied

dimension of maternal psychological well-being, has been shown to affect children's social or prosocial skills either directly or in synergy with parents' communicative behaviors (Choi, 2013; Hay & Pawlby, 2003; Renzaho & Karantzas, 2010; Wu, Selig, Roberts, & Steel, 2011). However, the evidence for such relationships is not very strong as studies are few and findings are not always consistent: for example, in a study by Koblinsky, Kuvalanta, and Randolph (2006) maternal depression was not associated to children's social skills. In addition, where directionality of relationships has been explicitly modelled (e.g., in structural equation models) only one direction is typically considered (parent-directed effects; e.g., Choi, 2013; Renzaho & Karantzas, 2010; Wu et al., 2011), even though reciprocity in parent-child interaction is important for children's prosocial and social skill development (Feldman et al., 2013).

Prosocial skills in children with autism and their relationship to parental well-being have not received much research attention. This contrasts heavily with the volume of research on the association between environmental factors and ASD comorbid behaviors, such as behavioral and emotional difficulties. Some recent evidence in the ASD field indicates that parents of children with higher prosocial behaviors perceive their relationship with their child as less stressful (Huang et al., 2014). This mirrors findings of a negative association between parenting stress and prosocial skills in families of children with an intellectual disability (ID), such that increased prosocial skills are associated with lower levels of parenting stress (Beck, Hasting, Daley, & Stevenson, 2004; Neece & Baker, 2008). These initial findings highlight that prosocial skills in children with an ASD may be related to factors in children's proximal environment, but clearly a lot more research is required to understand these relationships better. Many social skills interventions for children with autism are delivered by parents (Kaat & Lecavalier, 2013), and it is therefore important to understand how children's

prosocial skills relate to parents' psychological well-being, and how this may interact with parents' efforts to improve or alter children's social behaviors.

In the present study, our aim was to extend our understanding of the relationship between prosocial skills in young children with ASD and factors in their proximal environment, and more specifically, two dimensions of maternal psychological well-being: psychological distress, and life satisfaction. We examined these relationships in the early years of development, up to the age of 5 years, and we hypothesized that the relationships would be bidirectional. Our hypothesis was not based on previous evidence from ASD research or typical development because, to the best of our knowledge, there have been no studies to examine bidirectionality in these relationships either in typical development or autism. Our hypothesis was based on Sameroff's theory about developmental processes in the early years, where children are expected to be in a state of continuous transaction with their immediate environment (Sameroff, 2009). In the absence of existing evidence of directionality in ASD relationships, a test of bidirectionality is a more appropriate as it is consistent with developmental theory. We adopted a longitudinal design analyzed through structural equation models as this is a particularly robust test of reciprocity in human relationships (Cook & Kenny, 2005; Sameroff & Mackenzie, 2003).

2. Methods

2.1 Participants

Participants were identified from the third wave of the British Millennium Cohort Study (MCS3) when children were five years old. The MCS is a birth cohort designed to follow prospectively approximately 19,000 children born in the UK in 2000-1. MCS participants have been randomly selected to be representative of the UK population. Among the 15,246 cohort children in MCS3, 132 were reported as having been diagnosed with an ASD by the main respondent. This indicates a raw prevalence of .87%, for ASD, and .92% after

weighting to account for the complex survey design of the MCS (Totsika et al., 2013).

Twenty nine of these children also had an intellectual disability - identified by their cognitive

scores on subscales of the British Ability Scales (Elliott, Smith, & McCulloch, 1996) -

indicating a weighted prevalence of ID in the ASD group of about 28% (Totsika et al., 2013).

Children with ASD were mainly boys (82% males) and their families were significantly more

deprived throughout MCS waves (9 months, 3 years and 5 years) than families of children

without ASD (Totsika et al., 2013). After identifying the study participants at the age of 5

(MCS3), we looked at the two earlier surveys (at ages 3 years, and 9 months; MCS2 and

MCS1 respectively) to draw relevant study data as described in section 2.2.

2.2 Measures

2.2.1 Childrens' prosocial skills at 3 and 5 years

Prosocial skills were measured using the Strengths and Difficulties Questionnaire (SDQ;

Goodman, 1997) at 3 and 5 years. The SDQ measures hyperactivity, conduct problems, peer

relationship problems, emotional symptoms and prosocial behavior. Versions of the SDQ are

available for ages 3-4 and 5-16 years (www.sdqinfo.com). The current study focused on the

prosocial skills subscale of the SDQ. Parents reported how considerate of others' feelings

their child is; whether the child is kind to younger children; how willing to share toys or food

or other things with other children; whether s/he is helpful when someone is hurt or upset;

and whether the child often volunteers to help others. These five items are rated on a 0 (not

true) to 2 (certainly true) scale, and the subscale scores range from 0 to 10, with higher scores

indicating higher levels of prosocial skills. In our sample, internal consistency (Cronbach's α)

for the SDQ pro-social behavior scale was .84 at 5 years and .82 at 3 years. Prosocial skills,

as measured by the SDQ, have been found to be highly predictive of later ASD diagnoses

(Goodman, Lamping & Ploubidis, 2010). The parent-rated prosocial skills scale of the SDQ

has been used to assess prosocial skills among children with ASD in several other studies

(Horiuchi et al., 2014; Huang et al., 2014; Iizuka et al., 2010; Russel et al., 2012). These studies have taken place across different cultural and socioeconomic contexts (Japan, Taiwan, UK) and they are consistent in showing that prosocial skills measured using the SDQ are lower among children with autism compared to typically developing children. As expected, prosocial skills in our participants were substantially lower compared to MCS children without autism (weighted n = 13,583 at age 3; n = 15,098 at age 5) with a large standardised mean difference *d*: -1.12, 95% CI: -1.30,-.93 at age 3, and *d*: -1.43, 95% CI:-1.60, -1.26 at age 5.

2.2.2 Infant temperament at 9 months

To control for any effects of infant temperament on later maternal well-being and child behavior, a measure of infant temperament available at 9 months was used (Cronbach's α for the current sample .67). The temperament measure includes 17 items from the Revised Infant Temperament Questionnaire (RITQ; Carey & McDevitt, 1978) assessing the infant's mood, adaptability, approach/withdrawal and rhythmicity/regularity. Each item is rated on a 1 (almost ever) to 5 (almost always) scale and higher scores on the temperament composite used in the present study (achieved range 17-69) indicate a more difficult temperament. Differences in the temperament of infants subsequently diagnosed with autism emerge during the first year of life, and include reduced approach behaviors, increased negative affect, irritability, difficulties in self-regulating and being comforted by others (Bryson et al., 2007). The full RITQ has been used with children with ASD and profile scores differed from typical development (Hepburn & Stone, 2006).

2.2.3 Maternal psychological well-being

Psychological distress at 3 and 5 years was measured using the K6 (Kessler et al., 2002). The K6 was developed to screen community populations for non-specific psychological distress. The K6 includes six items on symptoms present in the past 30 days, measured on a 0 (none of

the time) to 4 (all of the time) scale (e.g., sad, restless, nervous, hopeless, worthless). When summed, scores can range from 0 to 24, with higher scores indicating higher distress levels. The K6 scores have been shown to have excellent predictive validity of DSM-IV diagnosed psychiatric disorders (other than substance abuse; Kessler et al., 2003). Internal consistency for the present sample was .88 and .97, at 3 and 5 years respectively. At 9 months, psychological distress was measured by a nine-item version of the Rutter Malaise Inventory (Rutter, Tizard, & Whitmore, 1970). Each item is measured on a 0 (rarely/never) to 2 (most of the time), and higher scores on the total distress measure indicate higher distress levels. Internal consistency in the present sample was .78. In MCS, these two different measures were used at different waves to capture psychological distress. While the K6 and the Rutter Malaise inventory are clearly different measures, they have both been developed to screen for psychiatric morbidity by tapping on the same underlying construct of psychological distress. For this reason, they were used together in the models fitted (see section 3).

At 9 months, 3 and 5 years, mothers rated how satisfied they felt with their own life on a single item (rated 1-10). Higher values indicated increased life satisfaction. Single-item life satisfaction assessments demonstrate considerable contextual and temporal stability across the population (Schimmack & Oishi, 2005), especially thoughout the adulthood years (Baird, Lucas, & Donnellan, 2010). The construct validity of this single-item life satisfaction assessment has been demonstrated by evidence of associations in the expected direction with age, health status, and various socioeconomic indicators (DEFRA, 2011). The measure was developed to provide a global assessment of subjective well-being and has been used in numerous national and cross-national surveys in Europe (http://www.esds.ac.uk/international/resources/wellbeing.asp?print=1).

To contextualise levels of maternal psychological well-being in our sample, standardized mean differences (*d*) on the measures above were computed between mothers of

children with ASD and the approximately 14,000 MCS mothers of children without autism.

Psychological distress at 5 years was slightly more elevated (small d:.36, 95% CI: .19, .54) in

mothers of children with autism, as indicated by the small statistically significant effect size.

Maternal distress at 3 years, and life satisfaction at both 3 and 5 ages did not differ between

two groups (all ds were very small with a confidence interval very close to zero, indicating

non-significance: d for distress at 3 years: .22, 95% CI: .02 to .42; d for life satisfaction at 3

years: -.20, 95% CI: -.39, -.01; and d for life satisfaction at 5 years: -.19, 95% CI: -.37, -.02).

2.2.4 *Cumulative deprivation*

To account for potential effects of deprivation on maternal mental health and child prosocial

skills, we created a composite measure of deprivation (Totsika et al., 2013) using information

from 9 months, 3 years and 5 years. From each time point, we included information on

income poverty (OECD <60% of median UK income), subjective poverty (mother report of

finding it quite/very difficult to manage financially), parental employment (at least one parent

working), and local neighborhood deprivation (Index of Multiple Deprivation, UK). Higher

scores on this cumulative deprivation index (possible range of scores 0-12) indicate persistent

high deprivation (Kuder Richardson coefficient for the present sample = .80).

2.3 Procedure

The current study is a secondary analysis of MCS data (Centre for Longitudinal Studies,

Institute of Education, University of London). Ethical approval for each MCS wave has been

granted by appropriate committees (Hansen, 2012), while a separate ethical review was not

required for the present study.

2.3.1 Statistical analyses

Structural equation modeling (SEM) was used to explore the hypothesized bidirectional

associations between children's prosocial skills and maternal psychological well-being. We

fitted longitudinal cross-lagged path models that test directly reciprocal relationships between

children's outcomes and environmental characteristics as proposed by the transactional theory of development (Sameroff, 2009). Such models have been fitted in previous research to test bidirectional relationships in families of children with a developmental disability (e.g., Neece & Baker, 2008) and children with autism (e.g., Totsika et al., 2013). We fitted one model to explore the association between prosocial skills and maternal psychological distress and a second model to explore the association between prosocial skills and maternal life satisfaction. Data were drawn from three MCS time points: 9 months, 3 years, and 5 years. At each time point the child and maternal variables were allowed to correlate (by allowing their error terms to correlate; not shown in figure) to account for concurrent associations present, while the main hypothesis was tested by the paths crossing across variables over time. We also fitted paths from one time point to the next within each construct to account for the variance in each variable that is accounted by longitudinal stability. The models were fitted in AMOS 18 (Arbuckle, 2009). SEM uses full information maximum likelihood procedures to deal with missing data, which has been shown to be an effective strategy for obtaining robust estimates (Alison, 2003; Byrne, 2010). Our exploration of missingness patterns indicated that missing data did not appear to be associated with study variables, an indication of missingness "not at random" (Schafer & Graham, 2002), as all correlations were small (ranging from -.210 to .253). We concluded that missing data were missing at random. Model fit was evaluated by four fit indices: the chi-square, the ratio of chi-square to degrees of freedom (CMIN/DF), the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA) with its 90% confidence intervals. All indicated very good fit and exact results are shown in Figure 1.

3. Results

Figure 1 presents the two SEM models with the standardized path coefficients between maternal and child variables. Moderate stability in prosocial skills between 3 and 5 years was

evident in both models (.616 and .613, p<.001, in the distress and life satisfaction models, respectively). Small to moderate stability was evident for maternal psychological distress (standardized paths from 9 months to 3 years to 5 years were .337 and .566, both p<.001), and life satisfaction (paths from 9 months to 3 years to 5 years were .460 and .408, both p<.001).

In terms of potential confounding variables, infant temperament had no effects on later maternal mental health or child prosocial skills (all paths were near zero). Cumulative deprivation had near zero effects on child prosocial skills (standardized paths were .058 in both models) and very small non-significant effects on maternal distress (path .127 , p>.05) and life satisfaction (path:.087, p>.05).

In terms of bidirectional relationships, there was no evidence that cross-lagged effects were present because all paths from maternal variables were non-significant. In fact, they were all very close to zero (ranging from -.024 to .059, all p>.05), suggesting that maternal mental health when the child was 9 months and 3 years had a near zero effect on child prosocial behavior at 3 and 5 years. However, children's prosocial skills at the age of 3 had a small significant effect on maternal psychological distress and life satisfaction two years later (standardized path for K6: -.186, p=.025; and for life satisfaction: .229, p=.010), suggesting that earlier child prosocial skills were associated with small reductions in maternal psychological distress and small increases in life satisfaction two years later. Both models accounted for about 38% of the variance in child prosocial scores at 5 years (all R^2 are shown in Figure 1).

--Insert Figure 1 here--

4. Discussion and conclusions

In the present study, our aim was to examine the association between the prosocial skills of young children with autism with maternal psychological distress and life satisfaction.

The findings did not support the hypothesis of bidirectional relationships, because maternal psychological well-being in the earlier MCS waves (9 months, 3 years) had no effect on later child prosocial skills. The observed lack of bidirectionality between child prosocial skills and maternal mental health could be population-specific. So, one possibility is that in children with autism, prosocial or other behaviors do not enter into bidirectional relationships with maternal behaviors as readily as one might expect from evidence in typically developing children (e.g., Padilla-Walker, Carlo, Christensen, & Yorgason, 2012). Though the studies that explicitly focused on bidirectionality in autism are few, their findings so far are consistent in suggesting lack of bidirectional relationships. Findings from two studies so far have failed to support hypothesized transactional relationships between behavior problems and maternal well-being, or between social skills and maternal criticism (Greenberg et al., 2006; Totsika et al., 2013). Similar, lack of bidirectional relationships between prosocial skills and parental well-being (stress in particular) when the child has an intellectual disability instead of autism might suggest that this insensitivity to transactions could be more pronounced in the presence of an intellectual disability, which was present in 28% of the current sample.

It is not possible to directly compare findings from this population to findings from typically developing children. One reason is because even among typically developing children, studies on bidirectionality are few and with contradictory results (Padilla-Walker et al., 2012; Steelman, Assel, Swank, Smith, & Landry, 2002). Another reason is that studies have not explicitly tested bidirectionality, rather they fitted only mother-driven effects on child prosocial or social behavior (e.g., Choi, 2013; Renzaho & Karantzas, 2010 ; Wu et al., 2011). In an Australian study with identical measures, Renzaho and Karantzas (2010) found a significant (though very small: -.07) path from maternal K6 psychological distress scores to child SDQ prosocial skills scores. However, their SEM model only examined the path from

mother to child, and the design was cross-sectional, indicating that the path described a concurrent association only.

In conclusion, the lack of a substantial body of previous research on reciprocal relationships between children's prosocial skills and factors in their proximal environment cannot help us understand whether the lack of reciprocity in the relationships examined here is specific to ASD, child age, or the particular dimensions of maternal psychological well-being examined. The assumption of transactional relationships with proximal environment variables has been hugely influential in the way we conceptualize child developmental processes, yet it has rarely been directly tested, either in autism or typical development. This is especially evident in the literature around prosocial and social skills. The present study is one attempt to address this shortcoming.

Our findings did show small significant paths from earlier (age 3) child prosocial skills to later (age 5) maternal psychological distress and life satisfaction. These findings are consistent with evidence from two cross-sectional studies that have shown children's prosocial skills (assessed by the SDQ) to predict independently maternal parenting stress in families of children with an ID (Beck et al., 2004) and families of children with autism (Huang et al., 2014). Results from the present study extend these findings to indicate that these effects are longitudinal and include aspects of maternal psychological well-being not directly related to parenting (i.e., broader psychological distress and overall life satisfaction).

Interestingly, the two hypothesized confounding variables controlled in our models did not present significant associations with the main child and maternal variables. With respect to infant temperament, the lack of associations might indicate that overall temperament is a poor precursor to prosocial skills, whereas aspects of infant temperament more closely related to social interactions, such as approach and withdrawal, might have been more appropriate. The lack of associations with SEP was perhaps unsurprising in light of

similar findings in other autism studies where the expected associations between child or mother outcomes and SEP are not found (Gray et al., 2012; Emerson et al., 2014; Totsika et al., 2013), indicating that variation in outcomes in autism, unlike intellectual disability, is potentially less sensitive to variation in socioeconomic circumstances.

Our study has many limitations, most notably the absence of diagnostic ascertainment of ASD, and the inclusion of outcomes based solely on maternal reports. In terms of the former, parent-reported ASD prevalence in MCS is at similar levels to known population estimates (Baird et al., 2006), lending some confidence about the overall sample size. In relation to the second limitation, mothers with a history of clinical depression have been shown to report lower levels of prosocial skills for their children, than children themselves would report (Hay & Pawlby, 2003). Prosocial skill levels in our participants were indeed significantly lower than those of typically developing children, and thus similar to previous findings (Horiuchi et al., 2014; Huang et al., 2014; Iizuka et al., 2010; Russel et al., 2012). However, psychological distress in mothers of 3-year old children with ASD was at levels comparable to the rest of the population. Even at age 5 when psychological distress was slightly elevated, the likelihood of a psychiatric disorder was not significantly higher among the ASD mothers compared to national norms (Totsika et al., 2013). This would suggest that the possibility for bias in maternal reporting of children's prosocial skills is very small, even though it cannot be excluded. For this, future studies would be strengthened by utilizing data from different sources. The use of independent observations of children's prosocial skills instead of maternal reports would ensure a more robust study design.

In light of the study limitations, practical implications of the findings should be considered only very tentatively. Prosocial skills seem to have a small, positive effect on maternal psychological well-being. Though tentative, this finding is important in at least two ways: (a) it provides some evidence that we should not always assume parent-driven effects

on prosocial skills, and (b) despite the lower levels of prosocial skills displayed by children with autism, other-directed behaviors such as helping, sharing, and being kind may serve to reduce psychological distress and make mothers happier. If this finding is replicated, it would highlight the potential of effective early intervention in improving not just children's outcomes, but also the well-being of mothers.

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Figure Captions

Figure 1. Three-wave cross lagged models examining the bidirectional relationship between prosocial skills of children with ASD with maternal

psychological distress (upper half) and maternal life satisfaction (lower half).
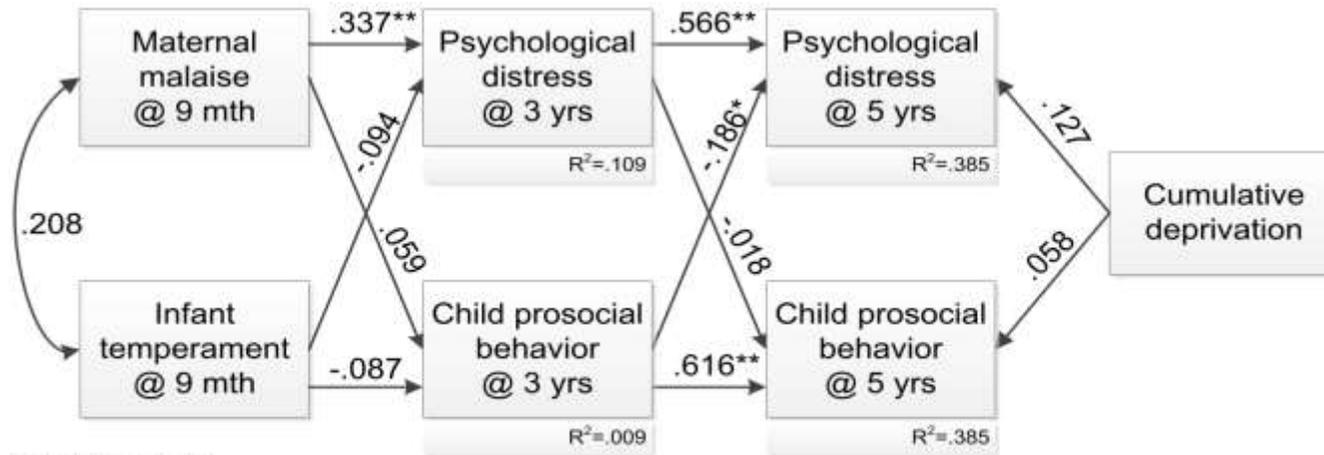
**: p<.001; *: p<.05
Model fit: Chi-sq.=7.38, p=.496; CMIN/DF=.923; CFI:1.000; RMSEA: .000 (90% CIs: .000, .110)
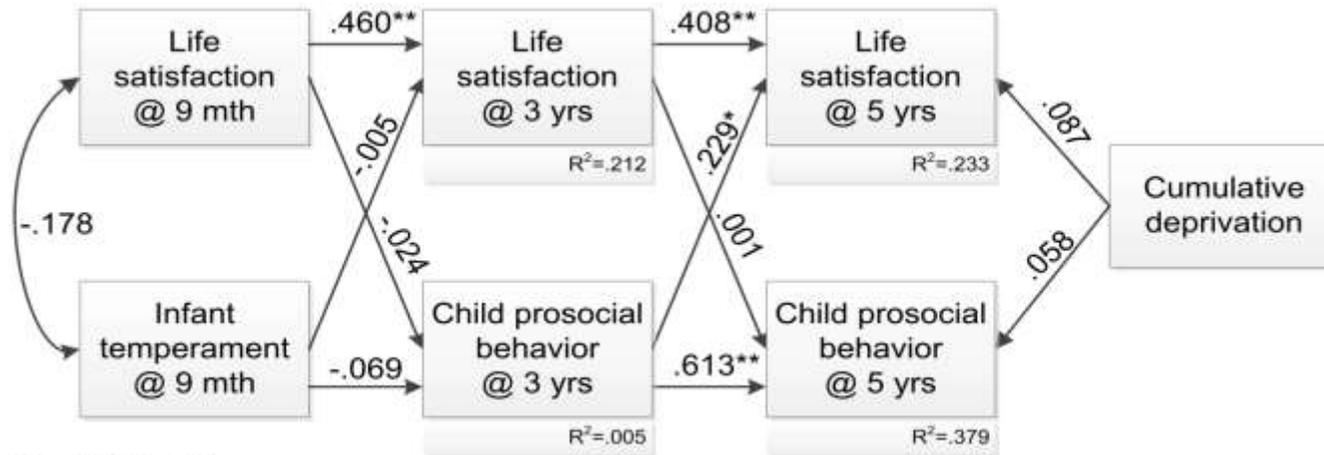
**: p<.001; *: p<.05
Model fit: Chi-sq.=7.02, p=.535; CMIN/DF=.877; CFI: 1.000; RMSEA: .000 (90% CIs: .000, .094)